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ABSTRACT

Reflection is a commonly used term in teacher education. Its meaning and use, however, varies from person to person and from program to program. Despite these variations, there is agreement that the goal of preparing reflective practitioners is a worthwhile endeavor in teacher education. The purpose of reflecting is to untangle a problem, or to make sense of a puzzling situation; reflection involves working toward a better understanding of the problem and ways of solving it. The first half of this paper is an extensive literature review on reflection in teacher education. The second half of the paper explores a conceptual framework constructed in the belief that if reflection on action is to be understood and valued by student-teachers, then it cannot be presented as an isolated event or process, but must be an integral component in the curriculum. The framework is illustrated by a case study designed to explore the relationship between the modeling of reflective practice and its development in and use by student teachers, and to demonstrate the effect this modeling has on one student teacher. The study indicates that three distinct periods of thinking occur--before, during, and after the lesson. During these periods there are opportunities for anticipatory, contemporaneous, and retrospective reflection. (Contains 25 references.) (ND)

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Windows into the thinking of an experienced teacher: Exploring the influence of spontaneous "Talk Aloud" in practice.

John Loughran

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Windows into the thinking of an experienced teacher: Exploring the influence of spontaneous "Talk Aloud" in practice.

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Introduction

There is an abundant literature on the topic of reflection. However, the diversity of views on what reflection means, how it might be recognised and documented, and how it might be developed in student-teachers makes it difficult for researchers and teacher educators to agree on how (and in some cases if) pre-service teacher education programs can develop reflective practitioners.

Reflection is a commonly used term in teacher education. However, its meaning and use varies from person to person and from program to program. Despite these variations there is agreement that the goal of preparing reflective practitioners is a worthwhile endeavour in teacher education. This paper suggests one framework for how this goal might be reasonably pursued, documented and analysed.

The conceptual framework (Figure 1) that underpins this project comes from the need for teacher educators to be better able to define and recognise reflection and to be able to facilitate its development in student-teachers. Although there are many structural features designed to aid in the development of reflective practitioners in pre-service programs, research into the use of reflection by teacher educators to guide and inform their practice and to model this for their students is lacking. Therefore the framework proposed is designed to explore the relationship between the modelling of reflective practice and its development in and use by student-teachers.

This approach is a response to many calls in the literature to better link the theory of reflection to the practices used in teacher education. Dewey (1933) drew teacher educators' attention to this in "How we think" and the calls have continued ever since. Goodman (1983; 1984) believed that a response to these

calls needed to examine three areas: (1) the focus of reflection, (2) the process of reflective thinking, and (3) the attitudes necessary for reflective individuals. Ross and Hannay (1986) complemented these points by arguing that:

> ...reflective inquiry has been promoted for many years as a progressive and effective method of teaching...its incorporation into classroom practice remains questionable...part of the blame [is due] to those interpreters of Dewey's inquiry model who advocate a procedural or technical rather than a dialectic approach to teaching. Teacher education practices also contribute to the lack of critical reflection existing in schools. Too frequently the rationale for reflective teaching is expounded through expository techniques and a technical inquiry approach...the university classroom must become not only the venue for transmitting traditional knowledge on teacher education but also a laboratory where such practices are modeled, experienced, and reflected upon. Such a truly reflective inquiry model needs to be firmly grounded in critical theory by incorporating the application of principles, not procedures, in the investigation...(p. 9)

Responses such as these are in accord with the desire to better understand and develop reflection in student-teachers and should be at the heart of good teacher education practice.

There has been little research into the modelling of reflective practice or its influence on student-teachers hence the conceptual framework outlined in this paper needs to be viewed in conjuction with what reflection means, how it might be detpcted in student-teachers and how it can be modelled in practice.

Reflection

Reflection is the deliberate and purposeful act of thinking which centres on ways of responding to problem situations in teaching and learning. Based on the work of Dewey (1933) reflection can be seen as deliberate because:

> reflection involves not simply a sequence of ideas, but a *con*-sequence - a consecutive ordering in such a way that each determines the next as its proper outcome, while each outcome in turn leans back on, or refers to, its predecessors. The successive portions of reflective thought flow out of one another and support one another; they do not come and go in a medley. Each phase is a step from something to something - technically speaking, it is a term of thought. Each term leaves a deposit that is utilized in the next term. The stream or flow becomes a train or chain. There are in any reflective thought definite units that are linked together so that there is a sustained movement to a common end. (Dewey, 1933, p. 4 - 5)

Similarly, reflection is purposeful because it aims at a conclusion. The purpose of reflecting is to untangle a problem, or to make more sense of a puzzling situation; reflection involves working toward a better understanding of the problem and the ways of solving it. "There is a goal to be reached, and this end sets a task that controls the sequence of ideas." (Dewey, 1933, p. 6)

Reflection then can be seen as a number of steps in thinking which, when organised and linked, lead to a consequence in action. These steps are suggestions, problem, hypothesis, reasoning and testing (Dewey, 1933). Although these phases need not follow in a particular order, the five phases combined comprise a reflective cycle. Also, even though reflection is aimed at resolving a problem, the results of testing in one reflective phase may well lead to further reflective action as the results of the test are reconsidered, evaluated and analysed. Just as the phases of reflection are linked, so reflective cycles may be linked. Because of the complex nature of teaching and learning, problem resolution is not absolute. It is context bound. Solutions from one context may guide thinking in another, but solutions are not necessarily universally appropriate or applicable. Reflection helps the individual to learn from experience because of the meaningful nature of the inquiry into that experience.

Learning about reflection through modelling

Student-teachers enter pre-service education with a wealth of experience as observers of teaching practice. But what they have generally been viewing and experiencing has been the end product of their teachers' thinking about how to teach particular content. They have most likely not been privy to the reasons why teaching strategies have (or have not) been employed, why a unit was taught in a particular sequence, or the influence of their learning on the teacher's approach to structuring future lessons.

Not surprisingly then, many student-teachers enter pre-service education expecting to be 'told' how to teach. There is no doubt that there are teaching skills and strategies that aid in one's effectiveness as a

teacher. However, teaching is far more complex than simply applying the *right* strategies or developing *the* skills necessary for content delivery.

Teaching is inextricably linked to learning. Teaching for understanding involves exploring the relationship between teaching and learning within the context of such things as: the content, and the teacher's understanding of the content; the nature of the students and their experiences; and the temporal and physical characteristics of the setting. The more these contextual issues are explored the greater the possibility that development beyond a purely technical approach to (and understanding of) teaching might occur. Hence there is a need for teachers to reflect on the relationship between the act of teaching and the experience of learning.

For student-teachers to understand reflection on practice the learning needs to encapsulate meaning within the experience. This is, as Schön (1987) pointed out, similar to being faced with the "Meno paradox."

> [I]n the first instance, he can neither do it nor recognize it when he sees it. Hence, he is caught up in a self-contradiction: "looking for something" implies a capacity to recognize the thing one looks for but the student lacks at first the capacity to recognize the object of his search. The instructor is caught up in the same paradox: he cannot tell the student what he needs to know, even if he has words for it, because the student would not at that point understand him. (Schön, 1987, p. 83)

Because unravelling this paradox of not knowing what needs to be known is difficult, many teacher educators attempt to simplify the problems associated with the 'uncertainty of practice' by reverting to a lecture on possible solutions. For this study, a key to unlock the Meno paradox is seen in the modelling of reflective practice for student-teachers in an attempt to help them see, experience, and construct an understanding of the nature of reflection on practice.

> In order to gain that sense of competence, control, and confidence that characterizes professionals, students of professional practice must first give it up. As they act and reflect in situations of perplexing uncertainty, mystery and frustration, that which is given up for the sake of experimenting begins to emerge in their development. Out of the darkness of student unknowing comes the light of professional practical knowledge. (Grimmett, 1988, p.11)

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If student-teachers see their teacher educators as reflective practitioners, if they experience the development of professional practical knowledge by being a part of that learning, then they might be helped to address the paradox in their own learning about practice. Modelling reflective practice must therefore involve much more than displaying the skills of an expert pedagogue (Berliner, 1986) It is not asking student-teachers to mimic the 'models' placed before them, it is showing that

> ...experimenting and the inevitable "mistakes" and confusions that follow are encouraged, discussed, and viewed as departure points for growth...a climate of trust, as well as the disposition to take learning seriously...begin[s] with the supervisor's own capacity for reflection on teaching, together with his or her ability to make this evident to the student teacher. (MacKinnon, 1989, p. 23)

Making reflection *evident* is a most important facet of modelling reflective practice for student-teachers. But how might this be adequately achieved?

Schön (1987) describes three forms of modelling that he proposes as ways that students learn from their supervisor's practice. The three models he proposes are the Hall of Mirrors, Joint Experimentation and Follow Me. Schön (1987) explains the three models as ways of "coaching reflective practice" and sees them as important ways for students to learn how to "frame the problems of practice." Therefore, for Schön, the three models are ways that students can learn to see how the practice setting appears through the eyes of an experienced practitioner.

The Follow Me model revolves around experienced practitioners being able to demonstrate and describe their pedagogical knowledge to their student-teachers. From these demonstrations and descriptions, the student-teacher attempts to develop and imitate the use of that pedagogical knowledge. With practice the student-teacher learns about the practice setting by *doing* in similar ways to the experienced practitioner. Discussing the actions from the experienced practitioner's and the student-teacher's perspective is important in learning about the practice setting.

The Joint Experimentation model involves the student-teacher being encouraged to take the lead in reflective inquiry. The experienced practitioner then follows the student-teacher's line of inquiry,

commenting, advising and offering alternatives as the need arises. In so doing, the student-teacher is able to question the problems of practice that occur in that setting.

The Hall of Mirrors model hinges on the need for the experienced practitioner's practice with the student-teacher to be an example of that which the student-teacher is attempting to understand and develop in his or her own practice. The important facet of this model is that the student-teacher needs to experience what it means to be a learner in the practice situation. It is anticipated that this experience will then reflect the position of the student-teacher's learners when he/she is the teacher.

Although each of these three models is presented as a separate form of coaching reflective practice it is clear that there are important aspects of each which would be called upon at different times, under different circumstances and in different situations to help student-teachers learn about reflection on action. There is a need for consistency between a teacher educator's teaching practice and his or her supervisory practice. There must be an ability to be detached from one's feelings about action in order to focus on the action itself and the student-teacher needs to be able to conceptualise actions from both the teacher's and the student's perspective.

Beyond these underlying principles there is one other aspect which plays an important role in the conceptualisation of modelling as applied to the conceptual framework in this paper. Because reflection resides in the mind of the individual it is difficult to directly observe. Therefore, if student-teachers are to have reflective practice truly modelled, if they are to be involved in experiencing and understanding the processes which shape the planning, implementation and reviewing of pedagogy, they need to hear what the teacher is thinking.

One way of responding to this need is through writing about the thinking that influences one's teaching through a journal and making it accessible to student-teachers. Another is by literally 'thinking aloud' during teaching so that student-teachers can access the processes, as they are occurring, that shape the

pedagogy at that time. Both of these are integral components to the modelling approach used in this study.

A difficulty created for student-teachers experiencing modelling of this nature is the need to continually juggle learning about learning and learning about teaching. Fundamentally they need to be able to juxtapose two perspectives on learning, the student's (ie. their own position) and the teacher's, as they become involved in determining what it means to be a reflective practitioner.

Reflection in perspective

If developing reflective practitioners is to be pursued in teacher education programs, and if modelling reflective practice is one method of doing this, then understanding stimuli for reflection is necessary. Reflection occurs in response to a puzzling situation. The problem, difficulty or concern needs to be apprehended and attended to. In so doing, reflection is an action which occurs in a context.

Reflection should not be taught as a process or algorithm ready and waiting to be applied at every possible opportunity. As Valli (1993) reminds us:

> ...if program goals are to be realized, a potential danger resides in valuing, or over-valuing, process. A process focus could detract from more central questions of the purpose, content and quality of reflection. How to get students to reflect can take on a life of its own, can become *the* programmatic goal. What students reflect on can become immaterial. (p. 19)

Therefore, if reflection is to be valued by student-teachers as a worthwhile attribute for their professional development, they must experience it as a logical consequence of learning to teach; not as a generalist process skill but as an appropriate tool for unpacking and learning from the uncertainties of practice.

There is a content to reflection, there must be something to reflect about. Therefore Dewey's (1933) attitudes of open-mindedness, responsibility and whole-heartedness may be more critical to the reflective process than the specific steps of the process itself (LaBoskey, 1993). Some student-teachers

may not see a situation as puzzling while others might. Being attuned to 'seeing' is being open-minded, seeing the problem situation in different ways is being responsible and wanting to respond, whilst accepting the consequences of action is to display the attitude of wholeheartedness (the three attitudes that Dewey (1933) describes as demonstrating a disposition to reflection). Enhancing these attitudes in student-teachers is an important precursor to reflection and, just as the results of reflection differ with the context, content and purpose, so the preparedness for reflection will vary with each of the individuals entering a pre-service education program.

With this in mind, another important element of this conceptual framework relates to the value student-teachers place on reflection and the practice of modelling. If student-teachers are to value reflective practice it is important that they are educated about it not trained in it. This distinction is important, as Shulman (1988) points out.

> Philosophers of education have distinguished between training and educating in part by pointing out the differences between teaching without reasons and teaching with explanations and understanding. To educate is to teach in a way that includes an account of why you do as you do...our obligation as teacher educators must be to make the tacit explicit. Teachers will become better educators when they can begin to have explicit answers to the questions, "How do I know what I know? How do I know the reasons for what I do? Why do I ask my students to perform or think in particular ways?" The capacity to answer such questions not only lies at the heart of what we mean by becoming skilled as a teacher; it also requires a combining of reflection on practical experience and reflection on theoretical understanding. (p. 33)

Seeking to know why is important if reflection is to be valued by student-teachers.

The conceptual framework proposed here is geared towards making the tacit explicit through modelling. But the intent is not that this be done by 'training' student-teachers in knowing and applying the phases of reflection, it is that this be done by probing, inquiring and challenging the student-teachers' attitudes and reflective processes (as well as mine, as their teacher) in the context of learning about teaching. This is based on the assumption that through the actions of modelling (as outlined above) reflection comes to be better understood, more meaningful and valuable to student-teachers, without explicitly stating the phases as they occur. Instead, this is done by illustrating the actions in the context of the learning at that time.

Difficulties in learning about reflection

The association between learning and reflection is an important focus for pre-service education programs that aim to develop reflective practitioners. Main (1985) stated that "reflection comes slowly to some people because they have little sense of involvement in their own learning," (p. 97) and it is this involvement in learning that is important in the development of one's use of reflection. However, there are difficulties associated with learning from reflection that need to be recognised. One of these is time.

The 'when' of reflection (the time of reflection in relation to the pedagogical experience) influences the learning that might be drawn from that experience. Three time frames are discernible: before, during and after an experience. At each of these times one's thoughts and actions may be considerably different, and the apparent and the real risks to the learner will vary, so that what one learns will be influenced accordingly.

If these times of reflection impact on learning in different ways, then learning from experience also takes on new meaning as the content of reflection will also be influenced by when it occurs; changes in time lead to changes in context. Therefore *when* a student-teacher reflects on practice will influence the subsequent learning from that experience.

McIntyre (1993) believes that student-teachers need to consciously and deliberately plan almost every step of their teaching and argues that they do not need to reflect in order to be conscious of what they are trying to do and know. Although it is indeed important for student-teachers to consciously and purposefully plan their teaching, there is an important difference between lesson planning (the mechanistic, structural and organisational aspects of a lesson) and reflection on possible pedagogical approaches to enhance student learning. Consider the student-teacher who has a 50 minute lesson in which to complete a science experiment with her class. In the first instance she will need to consciously and deliberately plan the lesson structure to ensure that the students know what they are expected to do, have the appropriate time to set-up and conduct their experiment, record their observations,

hypothesise, test (and perhaps re-test), make inferences and draw conclusions, pack-up their equipment, conduct their work in accordance with safety procedures and so on. All of these actions occur with a sense of timing in order that the lesson is a cohesive, self-contained session. If the lesson is to be completed in 50 minutes, then an appreciation for the length of time necessary for each activity is important. For the student-teacher, all of these actions call for conscious and deliberate planning.

In another instance, a student-teacher might be considering how to conduct an experiment so that the students are actively engaged in the learning, rather than simply following the instructions in a recipe style laboratory manual where thinking and understanding are not necessary for task completion. In this case, the student-teacher might apprehend a problem, for example the students do not think about what they are doing and why, and wonder how this problem might be addressed. Suggestions spring to mind or ideas from others might be sought. The student-teacher might hypothesise that if the method for the experiment was not supplied then the students would *really* have to understand the aim of the experiment in order to conduct the exercise. Reasoning through this could lead the student-teacher to prepare a practical lesson where the aim and apparatus were supplied, while leaving the students to determine a method to meet the aim. Testing that approach might occur in the student-teacher's mind and be further refined before it was tested in the classroom.

Both of these instances are examples of conscious and deliberate acts. They may also be being performed by the same student-teacher. The first instance involves lesson planning, the second is reflection on action prior to the pedagogical experience occurring. The distinction is important if reflection for action (Shulman, 1993) is to be distinguished from planning. Reflection for action is a way of apprehending and attending to a situation in anticipation of the experience.

> Anticipatory reflection enables us to deliberate about possible alternatives, decide on courses of action, plan the kinds of things we need to do, and anticipate the experiences we and others may have as a result of expected events or of our planned actions. Anticipatory re lection helps us to approach situations and other people in an organized, decision-making, prepared way. (van Manen, 1991, p. 101)

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Anticipatory reflection is a means of accessing or framing a problem situation before it occurs. It is an opportunity to prepare, to consciously and carefully anticipate a course of action to be tested. Contextual factors which may influence reflection at this time (for example, content knowledge, the age of the students, previous experience with the same group of students, the degree of uncertainty in outcomes a teacher is prepared to risk, etc.) will vary, but, obviously, reflecting on the situation combined with the subsequent testing that occurs will shape what a student-teacher learns from that experience.

In a similar fashion, reflection on action after an experience will also influence what a student-teacher learns. Again, the context will also be important as it shapes what is apprehended and what is attended to. This looking back on experience, or retrospective reflection, offers opportunities to make better sense of past experiences and to develop new or deeper understanding of that situation.

Consider the position of the student-teacher described earlier who decided to conduct her science class in a way that she hoped would lead to better student understanding of the experiment under consideration. Retrospective reflection allows her to question what happened during the class. Did the lesson work as planned? Was it a worthwhile experience for her students? How might that experience influence her approach to laboratory classes in future? Questions like these may well be the impetus for retrospective reflection which helps her to better understand her own pedagogical learning as well as the learning of her students.

Finally, imagine what might be occurring during the lesson. How much of what is happening might she see? What type of problems lead her to reframe? In the complex environment of the classroom where management and learning issues are continually arising and subsiding, how does she find time to address any of the puzzling situations which she might identify? Reflection on action during the pedagogical experience must also occur within contextual parameters. This contemporaneous reflection would seem to be most demanding, as the time frame for possible action (if testing is to influence the experience at hand), is much less than is the case in either anticipatory or retrospective reflection. But,

contemporaneous reflection may also be a most powerful and immediate experience of learning about pedagogy.

The conceptual framework (Figure 1) is constructed in the belief that if reflection on action is to be understood and valued by student-teachers, then it can not be presented as an isolated event or process. It needs to be an integral component in the curriculum. Reflection on action occurs at three distinct times in relation to pedagogical experience and within that experience it is highly context dependent. Therefore, these need to be evident in the modelling of reflection on practice.

My view of reflection is drawn from the work of Dewey (1933) and encompasses his descriptions of the three attitudes and the five phases of reflection. Dewey's view of reflection offers distinct phases (suggestions, problem, hypothesis, reasoning and testing) which may be more easily detected and described in student-teachers thinking about pedagogy than the larger more complex groupings described by Schön (1983); one way of interpreting Schön's 'reframing' is that it involves suggestions, problem and hypothesis. In terms of data gathering, Dewey's phases offer opportunities for reliable and verifiable instances of reflection and correspond to reflection-on-action. Also, as student-teachers are just embarking on their teaching career, the accompanying lack of teaching experience limits the likelihood that their developing reflective practice might incorporate the much more tacit, experience dependent reflection-in-action extensively described by Schön (1983, 1987).

Overview

The bases of reflection for this paper is defined as the purposeful, deliberate act of inquiry into one's thoughts and actions through which a perceived problem is examined in order that a thoughtful, reasoned response might be tested out. This process involves the five phases outlined by Dewey (1933) of suggestions, problem, hypothesis, reasoning and testing and, although they do not necessarily follow a particular order or sequence, the five combined comprise a reflective cycle. The results of the test from the reflective cycle may not satisfy the inquiring mind and may therefore lead to further reflection.

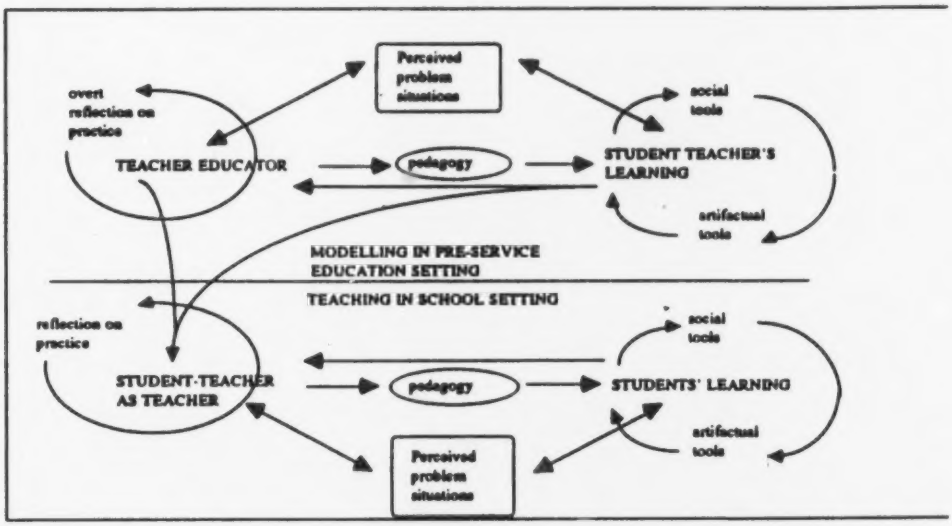
Also, differences in context influence problem recognition and therefore influence the nature of reflection. Experience from one context may influence thoughts and actions in another, but the complex nature of teaching and learning means that each situation may effectively be a new situation.

In pre-service teacher education programs, some important social and artifactual tools eg. journals, seminars and discussions (Richert 1987; 1990) may be employed to enhance student-teachers' use of reflection. However, these alone are not sufficient for genuine understanding of reflection on practice. Modelling of reflection within the context of the student-teachers' own teaching and learning experiences is important.

Although the term reflection on practice suggests a process of thinking after an activity, it does not mean that it is limited to this time. Reflection can occur before, during and after an experience, and in each case that which is recognised as a problem situation may vary, as will the reflective thinking and the subsequent learning. In any case, modelling of reflection must also portray these differences if the process is to be understood, and valued by student-teachers.

Through the application of the conceptual framework (Figure 1) to a pre-service teacher education program, it is anticipated that the development of reflective practitioners might be enhanced. Figure 1 represents the relationship between a teacher educator's modelling of reflection and a student-teacher's learning about reflection as problem situations are overtly apprehended and attended to through the teacher educator's pedagogy. As a result, both the student-teacher's learning and the teacher educator's modelling influence the student-teacher's pedagogy when he or she is the teacher. The artifactual and social tools in the pre-service education program comprise the student-teacher's journal writing, and interactions in seminars and discussions, in the school setting they comprise students' class notes (and other written work) and student-student and student-teacher interactions.

Figure 1 Conceptual framework.



Learning from the conceptual framework: developing a case-study

Schön (1983) and Yinger (1990) recognized the "reflective conversation", the responsive interchange between thinking and acting, as an insight into reflective practice. This reflective conversation can be regarded as an entree to the data of reflective practice. But how might this reflective conversation be documented, and how might such thoughts be recorded by an observer?

For the case study (only one is presented in this paper although others have been constructed) that follows, the conversation of reflective practice has been drawn from:

1) student-teachers' journals,

2) a teacher educator's journal,

3) transcripts from individual student-teacher interviews,

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4) transcripts from an interview-video-interview cycle of student-teachers teaching, then jointly reviewing the process with an observer.

The basis for the analysis is derived from these sources as supplied by the student-teacher participants as they progressed through their one year pre-service education course (February - November).

Coding the data centred on four major topics. These were:

i) what the students wrote about, the concerns or issues which prompted them to reflect,

ii) Dewey's (1933) attitudes of open-mindedness, responsibility and whole-heartedness,

iii) Dewey's (1933) elements of reflection: suggestions problem, hypothesis, reasoning and testing, and

iv) when reflection occurred in relation to the episode which initiated it.

Video-taped lessons followed a data collection technique similar to that described by Clarke (1991). This involved:

1) Each student-teacher being extensively interviewed prior to their lesson. This interview focussed on their plans for the lesson, the reasoning associated with the planning, how this lesson linked to previous and future lessons and any problems that might be foreseen. This took up to 60 minutes.

2) The lesson being video-taped from the rear of the classroom while the researcher took field notes of instances for later discussion.

3) A post lesson interview prior to viewing the video. This interview focussed on the student-teacher's reactions to the lesson and the exploration of teaching and learning instances considered important by the student-teacher.

4) An interview focussing on particular episodes from the lesson as illustrated by the video conducted immediately after 3) above.

The case-study is designed to be illuminative (Parlett and Hamilton, 1984) and to give a thorough understanding of the student-teacher's approach to teaching and reflection on practice as a result of experiencing a pre-service teacher education program in which the conceptual framework (Figure 1) was applied. The video taped lessons and accompanying interviews occurred during the last week of their third and final period of their teaching practice.

The case-study that follows has been constructed from a number of data sources: journals, individual interviews conducted through the year, the intensive interview-observation-interview cycle of the video-taped lesson, and the author's understanding of each individual from the viewpoint of tutor and researcher. It represents the type of teaching-learning relationship (which is equally important with respect to researcher-practitioner relationships) so important to this type of study. Noddings (1986) described this relationship as occurring when "we approach our goal by living with those whom we teach in a caring community, through modeling, dialogue, practice and confirmation." (p.502) The insights possible through these case-studies are the result of a relationship built up over the year of the Diploma in Education where the student-teachers and I learnt with and from one another in a variety of teaching and learning environments.

The case-study is written in an effort to portray a holistic view of the student-teacher in action. This is important as it places the student-teacher in context and enhances an understanding of the analysis of the observation-interview-observation cycle.

The format adopted (parallel columns of case and commentary) for presenting the case studies is similar to that used by Malcolm (1994) and is designed to enhance the reader's understanding of the issues being raised. The first column is the case-study itself and the second column serves as a commentary on the case-study. There are two purposes for this commentary. One is to elaborate on context (from the participants' perspective as well as mine), the second is to point to issues, events and episodes that are important for the research. The commentary column therefore strengthens the case-study by overtly highlighting some of the theoretical aspects which underpin data analysis of this nature.

The commentary in the right hand column is organised so that it occurs next to the issue being raised by the case study. Therefore, the commentary columns do not always align with the start of a paragraph in the case study column.

Pearl: In search of purpose

From day one Pearl was an impressive student-teacher. She was doing Dip. Ed. for a reason. She wanted to 'learn to teach' and for her, meaning was something that came from thinking and did not occur by 'osmosis'. She thought about and questioned most things in a deeper, more intense and open way than most of the others in her class. Everything had a purpose, and Pearl wanted to know and understand the purpose in everything she did. To some extent she was disappointed if others did not have a need to know, or took things on face value alone.

For Pearl, learning was enhanced through reflection.

Her journal ended up as a 'three volume classic' and uncovered a social conscience which directed her learning. Learning was power, and such power should be available to everyone, not just society's elite. She read widely and, not surprisingly, was particularly taken by the writing of Freire.

It was no accident that she chose to spend two of her teaching rounds in schools in the industrial suburbs of Melbourne which were 'disadvantaged' both socially and economically. The students she taught came from backgrounds which most of her classmates may have read about but rarely had first hand experience of. Where she taught, she would make a difference, she would try to help those less fortunate than herself share in the power of education.

Pearl displayed whole-heartedness. Her actions were as a result of substantial thinking and reasoning.

Everyone respected Pearl, perhaps none more than Perry. He saw her as someone worthy of the responsibilities of a teacher because she 'thought about her actions'. In Perry's eyes, Pearl asked the 'hard' questions not only of others, but of herself as well. In fact her thinking in some instances intimidated Perry because of the strength of her conviction and the depth of her thinking. Neither of them really 'suffered fools lightly', but each for different reasons. Pearl did not like to see individuals squander their own opportunities to learn whereas Perry did not like to see students' learning opportunities trivialised by thoughtless approaches to teaching.

Pearl's reflective nature was apparent to her peers.

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Although Pearl was unsure exactly what she was putting herself in for by being video-taped on her third teaching round, she nonetheless volunteered to be involved.

A chance to learn from experience demonstrated her open-mindedness.

When John arrived at the school he was surprised to hear that Pearl was nervous about the visit. She had spoken to Perry the previous night and his description of his time with John had sown a seed of doubt in her mind. For some reason Perry had rethought his approach to teaching since John's visit and this unsettled Pearl a little because she saw Perry as being very confident and sure of himself. "So what might your visit do to me?" she asked rhetorically.

John tried to set her mind at ease about the visit as they headed off to the staffroom. He also made a mental note to be attentive of Perry and to try to follow it up if the same thing came up in his final interview at Monash after the teaching round.

In the short time it took Pearl and John to get settled in the staffroom, she was already explaining what she was going to teach and why, what factors had contributed to her planning and how her lesson fitted into the whole unit she had devised. "I did an affective values thing and a lot of them were all over the place in what they think of refugees and stuff, so I made sure they knew the difference between physical and political refugees, then they're doing a lot of mapping work, one that shows refugees and one that shows where famine and war are. Then on a blank map they have to correlate the information to see if there's a relationship between the two," she explained with a passion that showed the importance of the issue to her. "They will also do a small activity on who's a refugee and who's an immigrant, then do a list of political and physical factors, I've already put up things that they think might cause refugees, during the next couple of lessons we're going through whether what they think is what actually happens. So to do a bit more of that in detail and then to go into the mapping work, which is mainly to do as individuals but then to bring them back as

Her anticipatory reflection demonstrated an integrated approach to teaching rather than a disjointed lesson by lesson approach.

She had worked through a number of suggestions and had tested her ideas through imaginative actions.

Anticipatory reflection that encompasses a holistic view of learning the content.

two's or three's for discussion. If I've got time at the end, then there's another question I want them to do for that affective stuff which is to write a paragraph about who they'd accept as African refugees into Australia, to see if that changes a little bit, but I'm still not sure if I have time to do that," she said.

Her planning seemed to be quite complex as she spoke about what she was doing and the ideas which underpinned her approach. John was surprised to hear Pearl say, "I plan out everything that I want to do and then when something happens to change it, it throws me, takes me off course. This unit has been changed two or three times now, I'm just at the point where I'm about to put it together but one of the things I've found difficult is just how to get across the basic concepts, how to get them across," she repeated to herself still thinking about her problem. "I haven't had enough time to work out how I want to do that," she concluded more to herself than to John. This interested John because he saw Pearl as being confident in herself and able to respond to the changing demands of teaching, yet clearly, although she was responsive, it was not something that she took 'in her stride'. Like Perry, planning was important in directing her thinking and she did not like to teach in ways that were not carefully thought through. She did not like to lose sight of the aim of a lesson nor did she purposely 'pad out' them out.

She readily recognises problems as she is planning her work. This causes her to reconsider her actions.

Anticipatory reflection is a deliberative and ongoing process.

Their discussion continued to throw up interesting lines which prompted John to revisit an idea he had been mulling over for some time. He was beginning to see that the more 'good student-teachers' thought about their teaching, the less sure they were about the best way to do it. "Perhaps this was a sign that they were reflecting on their teaching, moving beyond some technical approach to the job," he thought to himself. This was reinforced by Pearl's response to his question about what she thought the students would learn from her teaching. She said, "I suppose it's too vague, but to have an understanding of what causes refugees and where they go, and I want them to be able to do that by seeing it visually on the map and drawing their own conclusions from that. But I'm still not sure how I think I'm going to have that happen." She stopped and thought to herself for a moment then continued, "I don't even know if I'll know if it's a good lesson. I'm just not sure that I've given it enough. I like to be one hundred per cent certain about what I'm doing before I do it and I'm not, so it'll be difficult. I've been worried about doing it."

The quality of anticipatory reflection is influenced by the topic prompting it. Issues associated with student learning and developing students' understanding are intellectually demanding and difficult to simply resolve.

Although she has decided on particular pedagogical approaches she is predisposed to learn through testing her hypotheses.

Pearl glanced over her shoulder to the clock on the wall. "I'd better go," she said. "I'll pick you up here again after this lesson and then we'll go to 8C. OK." "Sure, no worries," John replied as Pearl ducked out of the staffroom and into the mass of students already milling around between periods. "I wonder what sort of pressure I'm putting her under?" John asked himself as he sipped his coffee. This would be Pearl's second class for the day, then she had the one which John would observe. "All this before lunch-time. She's right into the real world of teaching now," he thought.

Is there a relationship between physical well-being and reflection?

In John's mind the lesson went according to plan. Everything seemed to go well enough and Pearl had been attentive to her students. She had a reassuring nature and the students responded well to her efforts. John had struggled to find many instances during the lesson which he thought were worth discussing. Like his experience with Jack he would need Pearl to fill in most of the gaps. It reminded him more and more of the value of his 'thinking aloud' in TAL. It gave his student-teachers access to his thinking so that their discussions about pedagogy were based on knowledge about actions rather than assumptions. "I need to know her thinking. The problems she saw and how she resolved them. What was going on that I couldn't see?" he asked himself repeatedly during the lesson.

Without the video-tape of the lesson and Pearl to explain her thoughts and actions, gathering research data on contemporaneous reflection would be extremely difficult.

They sat down to watch the video of the lesson together. Pearl was pleased with the way things had gone. She thought it went quite well especially as the class had a couple of students who were very disruptive for other teachers. She did not think that they had learnt as much as she had expected and that an understanding of refugees had not 'completely sunk in yet'. She saw the next lesson as an opportunity to do some case-studies which would help resolve the issue for them.

Much of her anticipatory reflection had positively influenced her teaching.

When John asked how she would teach the lesson if she had to do it again he was surprised at her quick response. "When I was thinking about doing it, the other option I was thinking about was starting with a couple of specific countries that had refugees and making up some cards that had basic information and stuff and getting them to work out from that, maybe having questions about the conditions in the country and things like that, doing the same distinction with the drought and war and that, but I decided not to do that because it's probably too complicated. I don't know if maybe in that lesson it would be good to lead into it because it was very backwards and forwards. I'd like to work out a way of doing it where it wasn't so much but I'm not sure how I'd do that."

Detailed anticipatory reflection illustrating an abundance of possible suggestions.

Reasoning influences the actions to be tested.

Recognition of a pedagogical problem.

Before John had time to question her further, she added, "I don't like spending so much time doing something on the board and them copying it down, I should get them to copy it down as I go, but then some don't participate so I don't know, maybe I should try it the other way. Maybe with that profile thing, who's an immigrant and who's a refugee, I was thinking maybe I should've done that in more of a spoken way, but then I'm not guaranteed that they'd all do it so I still don't know that I would do it that way."

Retrospective reflection does not necessarily resolve a problem, it may be a catalyst for further problem recognition which may then influence hypothesis formation.

It amazed John that she had so many different options in her mind. She could readily recognise problems, reason through them and develop hypotheses to test in an instant. "How does this happen?" he asked himself. At the same time another thought quickly ran through his mind. "I really am hearing her think. This must be her reflective conversation," he said to himself as a grin of recognition, like an ocean wave gently rolled across his face.

Pearl's approach to reflection readily demonstrated the five phases described by Dewey (1933).

Many of the instances they discussed demonstrated how Pearl had learnt from her previous experiences and was applying that to her teaching. Her ability to test ideas or alternative approaches to action was apparent as she explained many of the episodes they watched together.

Reflection on practice demonstrably influenced Pearl's teaching

At one point a student reminded Pearl that the lesson was ten minutes shorter than normal. John stopped the video and asked Pearl to explain what happened in her mind in that split second. "I'm just trying to work out what it means for my timing, do I do five more minutes now or do I do it at the end. Also, I'm thinking I need to re-organise, do I do that, do I do something else, do I throw this out, come up with another ending perhaps, I'm going to have to make something up," she answered. "So what did you decide?" he asked. "Well, it's only ten minutes shorter, so the activity stays, I cut down the answers to question one so I reckon I can fit it in. That happens to me all the time at this school," she said articulating the thinking that was not obvious on the video-tape.

During contemporaneous reflection Pearl works through different scenarios - imaginative testing.

Pearl pointed out other instances which showed the complexity of the thinking behind some seemingly simple actions. Her concern for students' feelings and desire to help them learn was obvious. She had a soft spot for Jesse who never seemed to make sense of what was going on. She pointed out one such instant. "Well," she started as she thought about his answer to one of her questions, "I could've just dismissed it but he's just had a shocking report, he has an awful home life and he always sneers in class and opts out of the work, so when he says something, it's quite amazing that he would suggest anything, so I wanted him to see why his suggestion wasn't right but that I valued his input anyway. If he's not participating and I jump on him it doesn't help at all," she said as the video continued, then added, "I then went down to the back of the room to talk to him a little about it because of that and because I needed some thinking time to work out how to respond to him."

Most of the examples of contemporaneous reflection were to do with ways of enhancing student learning.

Pearl has to consciously make time in class to be able to reflect contemporaneously.

Throughout the video she pointed out instances which indicated how much she monitored what was going on in the class. She was acutely aware of individuals and conscious of trying to ensure that the thinking she started with them in class continued after the bell. "Is there anything I can do to stop it so as it stays in their heads or will they just say oh well it's over?" she said, directing the question more towards herself than John. This concern was particularly highlighted by her annoyance at the way she finished the lesson.

Pearl's teaching is driven by a desire to improve her students' learning.

She felt as though she would have to rethink how she would approach the next lesson, scrapping what she had planned, otherwise the unit would not hang together properly. John did not necessarily agree with all of her conclusions but was pleased to hear her describing the thinking which influenced her teaching.

Retrospective reflection triggered by pedagogical concerns.

As John leaned forward to turn off the video he asked Pearl what she thought about the lesson now that she had seen it and talked about it. She quite honestly and openly spoke about the difficulty she found watching herself in action. She was not really sure whether the students had learnt what she hoped they would learn. "How do you find out?" she said. "I can't tell just from that, there are no strategies there to tell me that except for when I do the discussions on refugees, so I don't know. I need to do something about that. What do I do?" she said. The look on her face suggested that she was already working through the question in her mind.

Pearl was able to stand back from the situation and reflect on her teaching. The process was not a threatening, it was an extension of her normal approach to retrospective reflection.

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The discussion about how the outcomes of the lesson would affect the rest of the unit continued for some time, then, almost out of the blue, Pearl said something that both pleased and worried John. "Now I'm not so sure that I want to be a teacher," she started. "Why's that?" John asked almost as a reflex to the statement. "Well you think about it. How do you get to a point where you are good? In fact I'm not even sure I know what good is now. I just think about what you learn and how you learn and how that affects the way you teach and am I doing it well enough." John was taken aback but sub-consciously pursued the point further. "So what's this process with me done to you?" he asked. "It clarifies that to be good is not so easy. I don't think anything dreadful happened but I don't know that anything good happened either. So you think well what have I done that's different and I don't know. Then part of me thinks it's got to do with understanding and maybe it's just not happening, and I don't know if it will and that's what worries me. It's muddy isn't it?" she said. She thought for a moment longer then finished by saying, "You quiz us quite a bit you know, so I probably focus more on it, you don't let us push it away to one side, we have to think, that makes it hard. There's so much I want to learn but it's really hard, you have to try it out and this has made me conscious of lots of things that I might've pushed to one side. You make me worry more about what and why. There's a lot to think about."

Retrospective reflection as a cycle where suggestions are reasoned through in a variety of ways.

Pearl did not see teaching as a set of skills to be acquired. Teaching is a complex task

To make sense of an experience requires reflection on action.

Being involved in this research project has been a catalyst for reflection.

"You are showing me the value of reflection to your learning about teaching. You're doing just fine, just fine," John said as much to reassure himself as to reassure Pearl.

As he drove back across town to the University a number of questions kept popping up. He had an image in his mind. He could see Dick saying, "You do not learn from experience. You learn by reflecting on experience." He hoped that this was what he was doing with his student-teachers, but there was a lot to think about. A lot to understand.

A research project of this nature not only influences the thoughts and actions of the participants, it also influences those of the researcher. Learning is not a one-way process.

Conclusion

The conceptual framework presented in this paper is designed to demonstrate how modelling of reflection on action in a teacher education program might influence student-teachers thinking and actions in their own practice. The case-study has been designed to demonstrate the influence that this modelling has on student-teachers as the acceptance of and actions in reflection are played out by Pearl. She demonstrates that three distinct periods of thinking occur (pre, during, and post lesson) and during

these periods there are opportunities for reflection. These three periods are opportunities for anticipatory reflection, contemporaneous reflection and retrospective reflection and have been demonstrated on numerous occasions in the modelling through her University course work in the Diploma in Education.

Loughran (1994) demonstrates that this modelling is indeed important in influencing student-teachers' reflection on practice, this paper illustrates how this conceptual framework operates and gives an example of how data derived from research within this framework might be gatheredm analysed and reported.

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